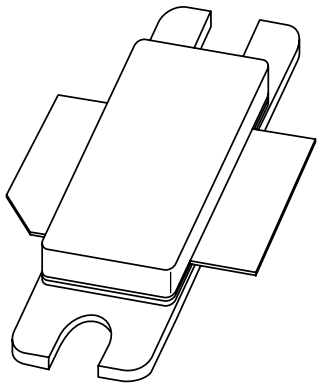
查询BLF2022-70供应商



# DATA SHEET



# BLF2022-70
## UHF power LDMOS transistor

Product specification
Supersedes data of 2002 Jul 04

2003 Feb 24

Philips
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# UHF power LDMOS transistor BLF2022-70

## FEATURES

- Typical W-CDMA performance at a supply voltage of 28 V and $I_{DQ}$ of 1 A:
  - Output power = 7.5 W (AV)
  - Gain = 12.5 dB
  - Efficiency = 20%
  - ACPR = –42 dBc at 3.84 MHz
  - $d_{im}$ = –36 dBc
- Easy power control
- Excellent ruggedness
- High power gain
- Excellent thermal stability
- Designed for broadband operation (2000 to 2200 MHz)
- Internally matched for ease of use.

## APPLICATIONS

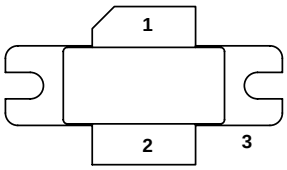
- RF power amplifiers for W-CDMA base stations and multicarrier applications in the 2000 to 2200 MHz frequency range.

## DESCRIPTION

70 W LDMOS power transistor for base station applications at frequencies from 2000 to 2200 MHz.

## PINNING - SOT502A

| PIN | DESCRIPTION |
|---|---|
| 1 | drain |
| 2 | gate |
| 3 | source, connected to flange |




Top view MBK394

Fig.1 Simplified outline.

## QUICK REFERENCE DATA

RF performance at $T_h$ = 25 °C in a common source test circuit.

| MODE OF OPERATION | f (MHz) | $V_{DS}$ (V) | $P_L$ (W) | $G_p$ (dB) | $\eta_D$ (%) | $d_{im}$ (dBc) |
|---|---|---|---|---|---|---|
| 2-tone, class-AB | $f_1$ = 2170; $f_2$ = 2170.1 | 28 | 65 (PEP) | >11 | >30 | ≤–25 |

| CAUTION |
|---|
| This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling. For further information, refer to Philips specs.: SNW-EQ-608, SNW-FQ-302A and SNW-FQ-302B. |

## LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 60134).

| SYMBOL | PARAMETER | MIN. | MAX. | UNIT |
|---|---|---|---|---|
| $V_{DS}$ | drain-source voltage | – | 65 | V |
| $V_{GS}$ | gate-source voltage | – | ±15 | V |
| $I_D$ | DC drain current | – | 9 | A |
| $T_{stg}$ | storage temperature | –65 | +150 | °C |
| $T_j$ | junction temperature | – | 200 | °C |

## THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th\ j\text{-}h}$ | thermal resistance from junction to heatsink | $T_h$ = 25 °C; note 1 | 1.15 | K/W |

**Note**

1. Determined under specified RF operating conditions.

## CHARACTERISTICS

$T_j$ = 25 °C unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_{(BR)DSS}$ | drain-source breakdown voltage | $V_{GS}$ = 0; $I_D$ = 1.4 mA | 65 | – | – | V |
| $V_{GSth}$ | gate-source threshold voltage | $V_{DS}$ = 10 V; $I_D$ = 140 mA | 4.4 | – | 5.5 | V |
| $I_{DSS}$ | drain-source leakage current | $V_{GS}$ = 0; $V_{DS}$ = 26 V | – | – | 10 | μA |
| $I_{DSX}$ | on-state drain current | $V_{GS}$ = $V_{GSth}$ + 9 V; $V_{DS}$ = 10 V | 18 | – | – | A |
| $I_{GSS}$ | gate leakage current | $V_{GS}$ = ±15 V; $V_{DS}$ = 0 | – | – | 25 | nA |
| $g_{fs}$ | forward transconductance | $V_{DS}$ = 10 V; $I_D$ = 5 A | – | 4.2 | – | S |
| $R_{DSon}$ | drain-source on-state resistance | $V_{GS}$ = $V_{GSth}$ + 9 V; $I_D$ = 5 A | – | 0.15 | – | Ω |
| $C_{rs}$ | feedback capacitance | $V_{GS}$ = 0; $V_{DS}$ = 26 V; f = 1 MHz | – | 3.4 | – | pF |

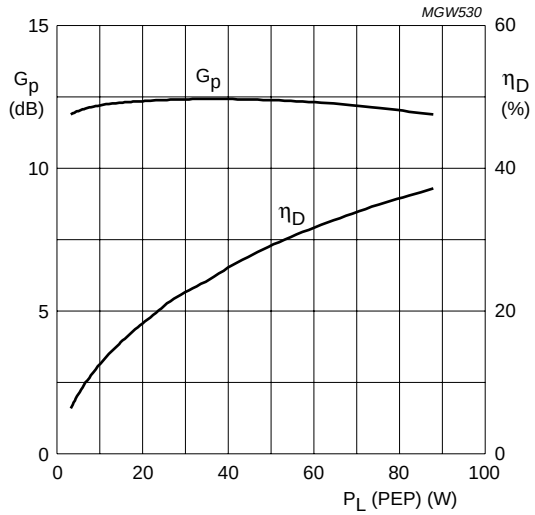
## APPLICATION INFORMATION

RF performance in a common source class-AB circuit. $T_h$ = 25 °C; $R_{th\ j\text{-}h}$ = 1.15 K/W; unless otherwise specified.

| MODE OF OPERATION | f (MHz) | $V_{DS}$ (V) | $I_{DQ}$ (mA) | $P_L$ (W) | $G_p$ (dB) | $\eta_D$ (%) | $d_{im}$ (dBc) |
|---|---|---|---|---|---|---|---|
| 2-tone, class-AB | $f_1$ = 2170; $f_2$ = 2170.1 | 28 | 500 | 65 (PEP) | >11 | >30 | ≤–25 |

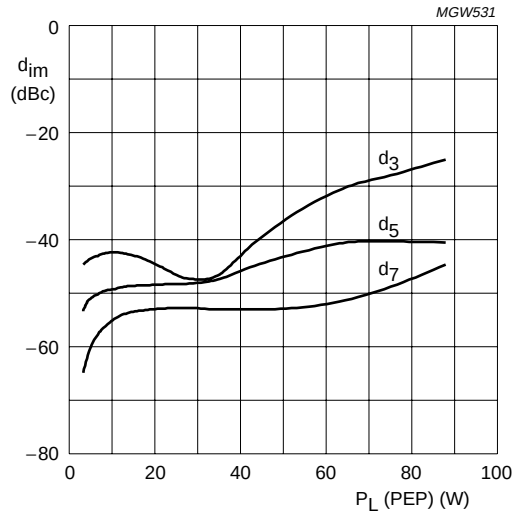
### Ruggedness in class-AB operation

The BLF2022-70 is capable of withstanding a load mismatch corresponding to VSWR = 10 : 1 through all phases under the following conditions: $V_{DS}$ = 28 V; $I_{DQ}$ = 500 mA; $P_L$ = 65 W (CW); f = 2170 MHz.



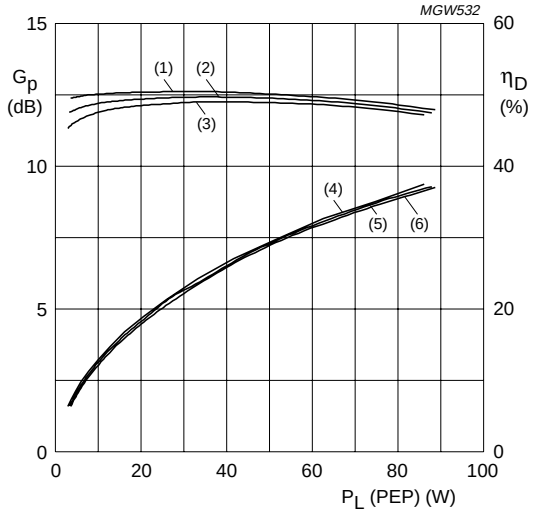

$V_{DS}$ = 28 V; $I_{DQ}$ = 500 mA; $T_h \leq 25$ °C;
$f_1$ = 2170 MHz; $f_2$ = 2170.1 MHz.

Fig.2 Power gain and drain efficiency as functions of peak envelope load power; typical values.




$V_{DS}$ = 28 V; $I_{DQ}$ = 500 mA; $T_h \leq 25$ °C;
$f_1$ = 2170 MHz; $f_2$ = 2170.1 MHz.

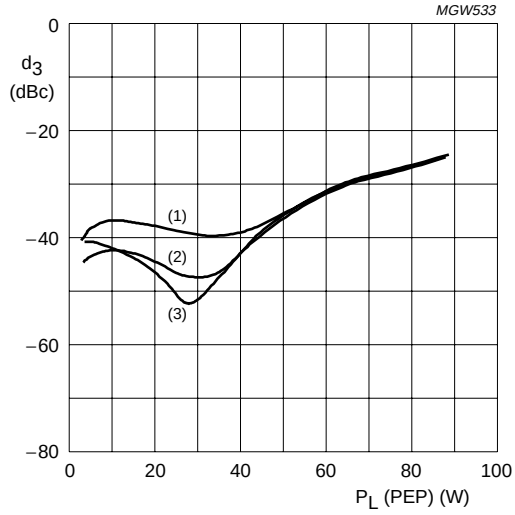
Fig.3 Intermodulation distortion as a function of peak envelope load power; typical values.




$V_{DS}$ = 28 V; $T_h \leq 25$ °C;
$f_1$ = 2170 MHz; $f_2$ = 2170.1 MHz.

(1) $I_{DQ}$ = 600 mA. (3) $I_{DQ}$ = 400 mA. (5) $I_{DQ}$ = 500 mA.
(2) $I_{DQ}$ = 500 mA. (4) $I_{DQ}$ = 400 mA. (6) $I_{DQ}$ = 600 mA.

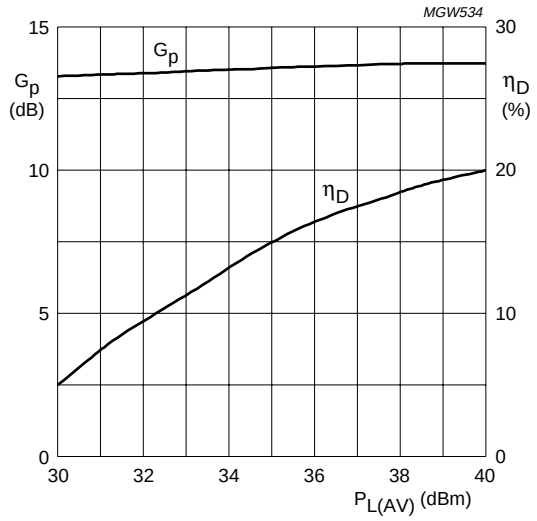
Fig.4 Power gain and drain efficiency as functions of peak envelope load power; typical values.




$V_{DS}$ = 28 V; $T_h \leq 25$ °C;
$f_1$ = 2170 MHz; $f_2$ = 2170.1 MHz.

(1) $I_{DQ}$ = 400 mA. (2) $I_{DQ}$ = 500 mA. (3) $I_{DQ}$ = 600 mA.

Fig.5 Third order intermodulation distortion as a function of peak envelope load power; typical values.



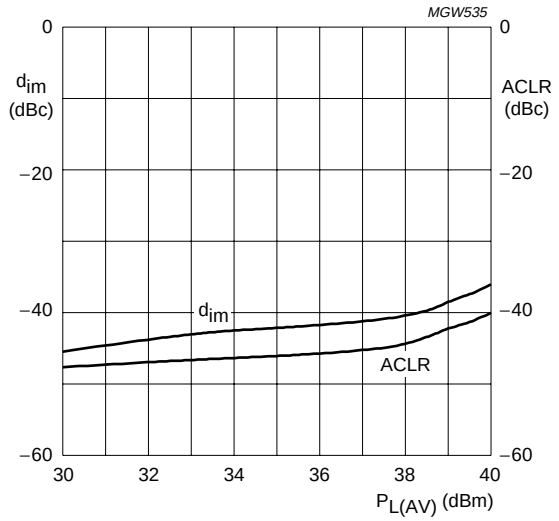

$V_{DS}$ = 28 V; $I_{DQ}$ = 450 mA; $T_h \leq 25$ °C;
$f_1$ = 2135 MHz; $f_2$ = 2145 MHz.

Two-carrier W-CDMA performance.

Input signal: 3GPP W-CDMA 1-64DPCH with 66 % clipping; peak to average power ratio: 8.5 dB at 0.01 % and 9.2 dB at 0.0001 % (CCDF) per carrier;
channel spacing/bandwidth = 5 MHz / 3.84 MHz.

Measured in a W-CDMA application circuit.

Fig.6 Power gain and drain efficiency as functions of average load power; typical values.



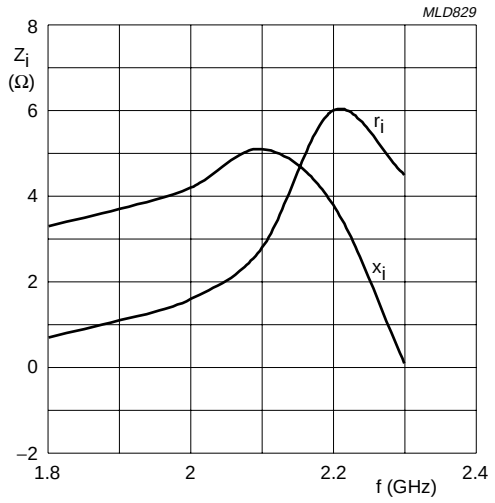

$V_{DS}$ = 28 V; $I_{DQ}$ = 450 mA; $T_h \leq 25$ °C;
$f_1$ = 2135 MHz; $f_2$ = 2145 MHz.

Two-carrier W-CDMA performance.

Input signal: 3GPP W-CDMA 1-64DPCH with 66 % clipping; peak to average power ratio: 8.5 dB at 0.01 % and 9.2 dB at 0.0001 % (CCDF) per carrier;
channel spacing/bandwidth = 5 MHz / 3.84 MHz.

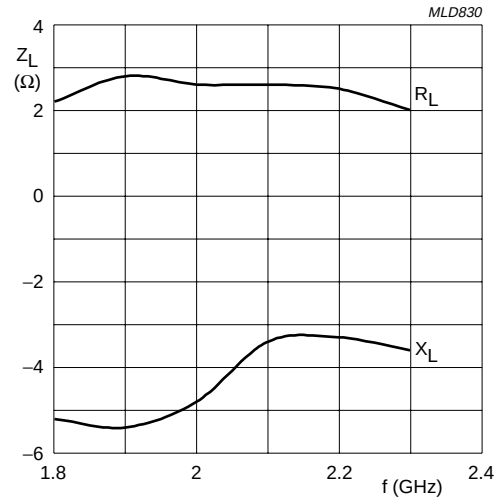
Measured in a W-CDMA application circuit.

Fig.7 Intermodulation distortion and adjacent channel power ratio as functions of average load power; typical values.




$V_{DS}$ = 28 V; $I_D$ = 500 mA; $P_L$ = 65 W; $T_h \leq 25$ °C.

Fig.8 Input impedance as a function of frequency (series components); typical values.




$V_{DS}$ = 28 V; $I_D$ = 500 mA; $P_L$ = 65 W; $T_h \leq 25$ °C.

Fig.9 Load impedance as a function of frequency (series components); typical values.

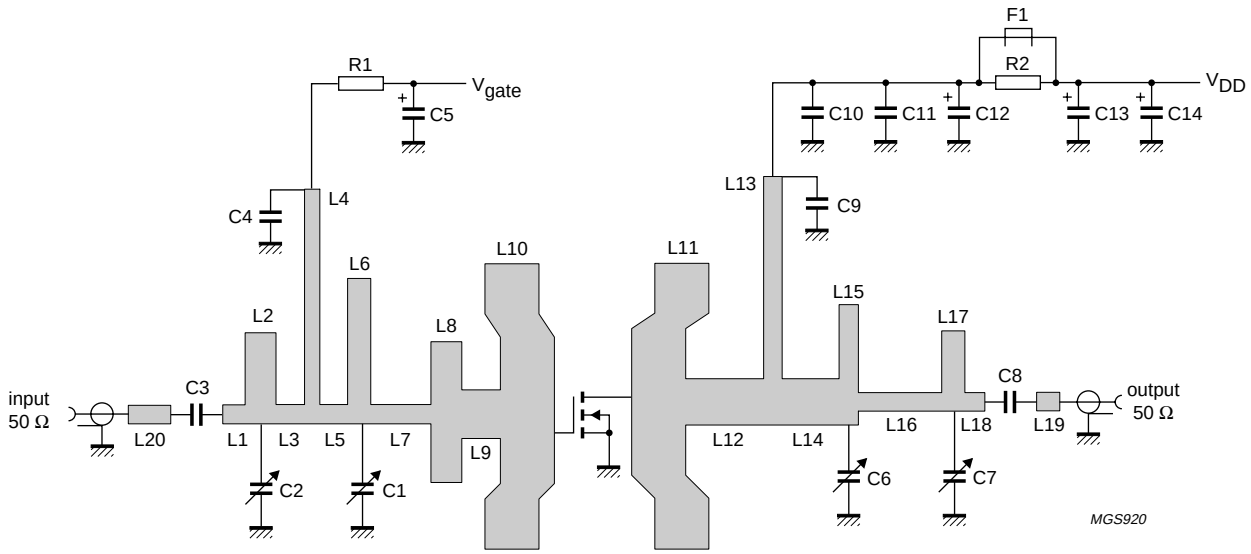


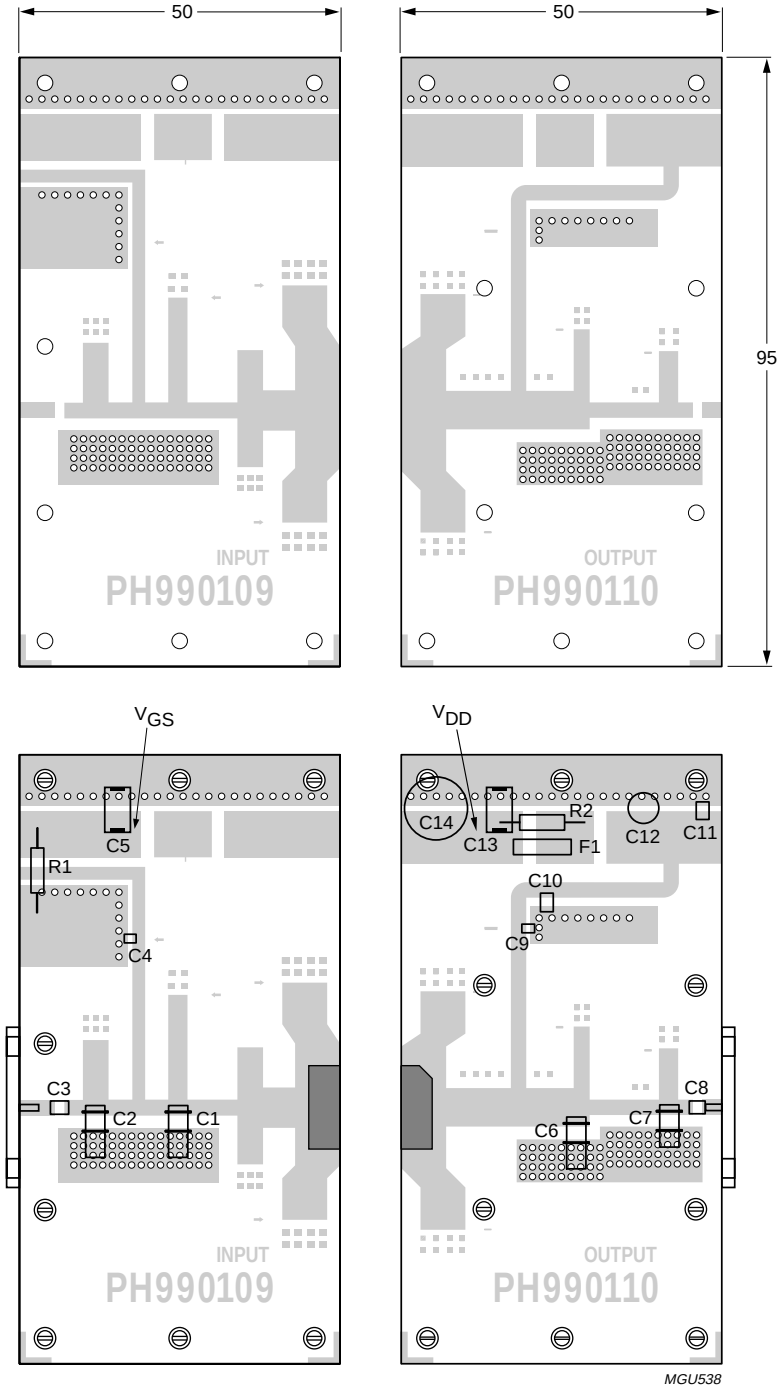

Fig.10 Class-AB test circuit at f = 2.2 GHz.

**List of components** (See Figs 10 and 11)

| COMPONENT | DESCRIPTION | VALUE | DIMENSIONS | CATALOGUE NO. |
|---|---|---|---|---|
| C1, C2, C6, C7 | Tekelec variable capacitor; type 37281 | 0.4 to 2.5 pF | | |
| C3, C8 | multilayer ceramic chip capacitor; note 1 | 12 pF | | |
| C4, C9 | multilayer ceramic chip capacitor; note 2 | 12 pF | | |
| C5, C12 | electrolytic capacitor | 10 μF; 100 V | | 2222 037 59109 |
| C10 | multilayer ceramic chip capacitor; note 1 | 1 nF | | |
| C11 | multilayer ceramic chip capacitor | 100 nF | | 2222 581 16641 |
| C13 | tantalum SMD capacitor | 4.5 μF; 50 V | | |
| C14 | electrolytic capacitor | 100 μF; 63 V | | 2222 037 58101 |
| F1 | Ferroxcube chip-bead 8DS3/3/8/9-4S2 | | | 4330 030 36301 |
| L1 | stripline; note 3 | 50 Ω | 2.9 × 2.4 mm | |
| L2 | stripline; note 3 | 14.5 Ω | 4 × 11.7 mm | |
| L3 | stripline; note 3 | 50 Ω | 3.7 × 2.4 mm | |
| L4 | stripline; note 3 | 6 Ω | 2 × 30.8 mm | |
| L5 | stripline; note 3 | 50 Ω | 3.6 × 2.4 mm | |
| L6 | stripline; note 3 | 9.5 Ω | 3 × 18.8 mm | |
| L7 | stripline; note 3 | 50 Ω | 7.8 × 2.4 mm | |
| L8 | stripline; note 3 | 9.8 Ω | 4 × 18.3 mm | |
| L9 | stripline; note 3 | 24.4 Ω | 5 × 6.3 mm | |
| L10, L11 | stripline; note 3 | 5.1 Ω | 7 × 37 mm | |
| L12 | stripline; note 3 | 25.4 Ω | 10.1 × 6 mm | |
| L13 | stripline; note 3 | 5.7 Ω | 2.4 × 32.8 mm | |
| L14 | stripline; note 3 | 25.4 Ω | 7.4 × 6 mm | |
| L15 | stripline; note 3 | 11.3 Ω | 2.5 × 15.6 mm | |
| L16 | stripline; note 3 | 50 Ω | 10.8 × 2.4 mm | |
| L17 | stripline; note 3 | 16.1 Ω | 3 × 10.4 mm | |
| L18 | stripline; note 3 | 50 Ω | 2.3 × 2.4 mm | |
| L19 | stripline; note 3 | 50 Ω | 3 × 2.4 mm | |
| L20 | stripline; note 3 | 50 Ω | 5.5 × 2.4 mm | |
| R1, R2 | metal film resistor | 10 Ω, 0.6 W | | 2322 156 11009 |

**Notes**

1. American Technical Ceramics type 100B or capacitor of same quality.
2. American Technical Ceramics type 100A or capacitor of same quality.
3. The striplines are on a double copper-clad printed-circuit board with Teflon dielectric ($\varepsilon_r$ = 2.2); thickness 0.79 mm.



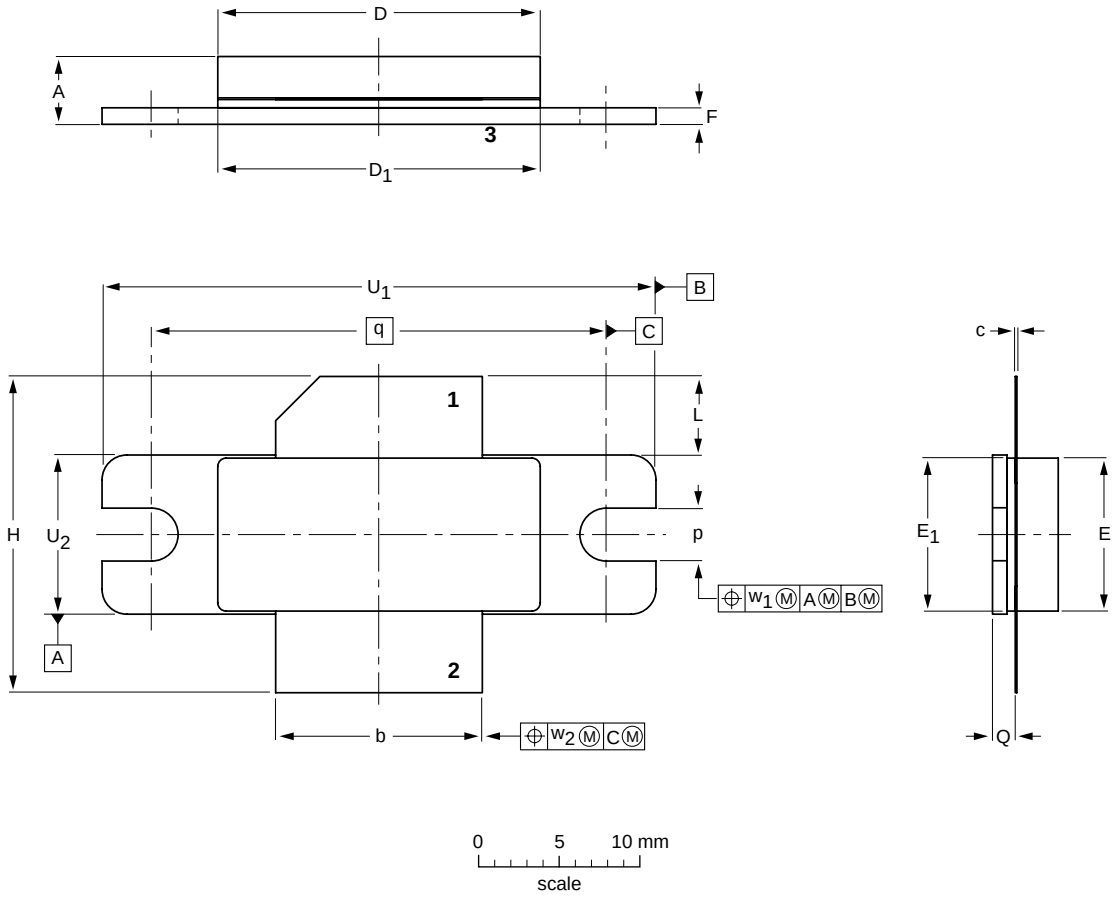

Dimensions in mm.

The components are situated on one side of the copper-clad printed-circuit board with Teflon dielectric ($\varepsilon_r$ = 2.2), thickness 0.79 mm. The other side is unetched and serves as a ground plane.

Fig.11 Component layout for 2.2 GHz class-AB test circuit.

## PACKAGE OUTLINE

**Flanged LDMOST ceramic package; 2 mounting holes; 2 leads** **SOT502A**




**DIMENSIONS (millimetre dimensions are derived from the original inch dimensions)**

| UNIT | A | b | c | D | $D_1$ | E | $E_1$ | F | H | L | p | Q | q | $U_1$ | $U_2$ | $w_1$ | $w_2$ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 4.72<br>3.43 | 12.83<br>12.57 | 0.15<br>0.08 | 20.02<br>19.61 | 19.96<br>19.66 | 9.50<br>9.30 | 9.53<br>9.25 | 1.14<br>0.89 | 19.94<br>18.92 | 5.33<br>4.32 | 3.38<br>3.12 | 1.70<br>1.45 | 27.94 | 34.16<br>33.91 | 9.91<br>9.65 | 0.25 | 0.51 |
| inches | 0.186<br>0.135 | 0.505<br>0.495 | 0.006<br>0.003 | 0.788<br>0.772 | 0.786<br>0.774 | 0.374<br>0.366 | 0.375<br>0.364 | 0.045<br>0.035 | 0.785<br>0.745 | 0.210<br>0.170 | 0.133<br>0.123 | 0.067<br>0.057 | 1.100 | 1.345<br>1.335 | 0.390<br>0.380 | 0.01 | 0.02 |

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | JEITA | | | |
| SOT502A | | | | | | ~~99-12-28~~<br>03-01-10 |

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